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(54) **Mercury-free high-intensity discharge lamp operating apparatus and mercury-free metal halide lamp**

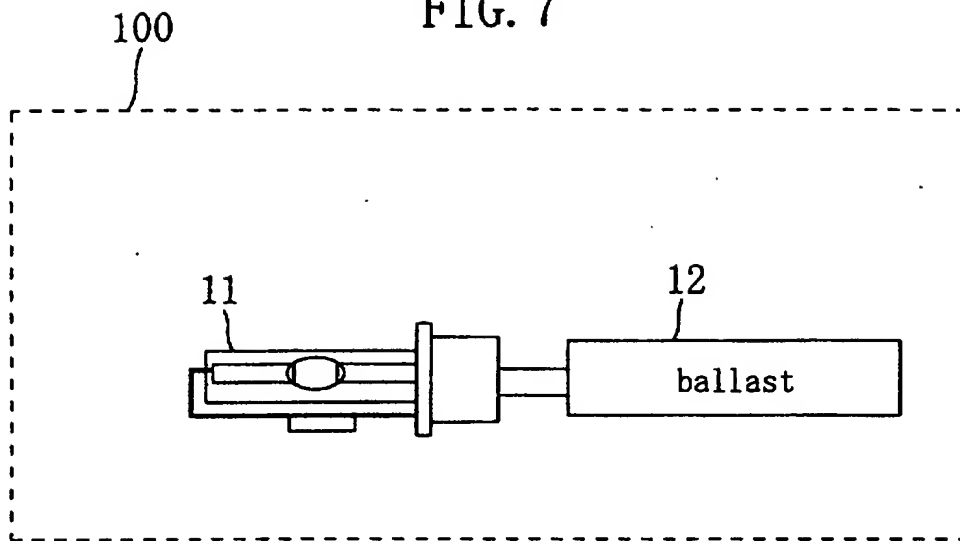
(57) A mercury-free high-intensity discharge lamp operating apparatus (100) includes a horizontally operated high-intensity discharge lamp (11) including an arc tube (1) in which a luminous material (6) is enclosed and a pair of electrodes (3) are arranged in the arc tube (1); a ballast (12) including an alternating current generation means for supplying alternating current to the pair of electrodes (3); and a magnetic field application means (10) for applying in substantially vertical direction a magnetic field having a component that is substantially perpendicular to a straight line connecting heads of the pair of electrodes (3); wherein mercury is not included as the luminous material in the arc tube. The present invention satisfies the relationship

$$0 < (100BW / f) - P_o d < 100$$

wherein B(mT) is the magnetic field applied to a center between the heads of the pair of electrodes (3), d(mm) is a distance between the heads of the pair of electrodes (3), P_o (MPa) is a pressure inside the arc tube (1) during steady-state operation, W(W) is a power consumed during steady-state operation, and f(Hz) is a steady-state frequency during steady-state operation.

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FIG. 7





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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 00 16360 A (TAKAHASHI KIYOSHI ;KIRYU HIDEAKI (JP); SAITO TAKESHI (JP); TAKEDA) 23 March 2000 (2000-03-23)	11-13, 17-20	H01J61/82 H01J61/12 H01J61/16
Y	* page 2, line 16 - line 22 * * page 8, line 3 - line 19 * * page 10, line 14 - line 18 * * page 15, line 22 - page 16, line 11 * * page 16, line 23 - page 17, line 22 * * page 18, line 5 * * page 18, line 16 - page 20, line 25 * * page 21, line 7 - line 20 * * page 22, line 5 * * page 22, line 13 - line 16 * * page 23, line 2 - line 6 * * page 23, line 15 - line 23 * * page 24, line 1 - line 8 * * page 24, line 21 * * page 25, line 4 - line 16 * * page 26; figures 1,7-10 * * page 27, line 15 - line 16 *	15,16	
E	-& EP 1 037 257 A (MATSUSHITA ELECTRIC IND CO LTD) 20 September 2000 (2000-09-20)	11-13, 17-20	TECHNICAL FIELDS SEARCHED (Int.Cl.7) H01J
P,Y	* page 2, line 6 - line 9 * * page 2, line 28 - line 33 * * page 3, line 1 - line 26 * * page 4, line 11 - page 9, line 22 * * claims *	15,16	
E	-& EP 1 032 010 A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) 30 August 2000 (2000-08-30)	11-13, 17-20	
P,Y	* column 1, line 5 - line 10 * * column 1, line 53 - line 55 * * column 2, line 2 - line 4 * * column 2, last line - column 3, line 3 * * column 3, line 55 - column 4, line 41 * * column 6, line 36 * -/--	15,16	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 October 2001	Examiner Martin Vicente, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons A : member of the same patent family, corresponding document	

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y A	* column 6, line 54 * * column 7, line 17 - line 18 * * column 10, line 47 * * column 11, line 6 - line 24 * * column 11, line 52 - column 12, line 29 * * column 12, line 41 - column 13, line 15 * * column 15, line 45 - column 16, line 21 * * column 16, line 43 - line 51 * * column 17, line 1 - line 31 * * column 17, line 41 - column 19, line 20 * * claims 5-11 * --- WO 99 05699 A (KONINKLIJKE PHILIPS ELECTRONICS N.V. ET AL.) 4 February 1999 (1999-02-04)	11,13, 17-19 15,20 12	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
	* abstract; claims 1,5,6 * * page 2, line 5 - page 3, line 9 * * page 5, line 5 - line 6 * * page 5, line 28 * --- -/--		
The present search report has been drawn up for all claims			
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**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-10

Method of using discharge lamps

2. Claims: 11-20

Indium halide lamp



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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,E	EP 1 111 653 A (MATSUSHITA ELECTRIC IND CO LTD) 27 June 2001 (2001-06-27) * abstract; claims 1-9,23; figures 1-15 * * page 1 - page 5, line 12 * * page 8, line 47 - line 48 * * page 9, line 1 - line 5 * * page 9, line 12 * * page 9, line 47 - line 50 * * page 13, line 4 * * page 13, line 13 - line 27 * * page 13, line 35 - line 36 * * page 14, line 38 - line 44 * * page 15, line 49 - line 57 * * page 17, line 27 - line 29 * ---	1-20	
E P,Y	EP 1 076 353 A (PATRA PATENT TREUHAND) 14 February 2001 (2001-02-14) * abstract; claims 1,4,8; table 1 * * page 2, line 50 - line 54 * * page 3, line 2 - line 3 * * page 3, line 11 - line 15 * * page 3, line 20 - line 21 * * page 3, line 39 - line 47 * * page 3, line 55 - line 56 * * page 4, line 42 - line 43 * * page 6, line 5 * * page 6, line 14 - line 15 * ---	11-13, 17-19 20	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 October 2001	Examiner Martín Vicente, M
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EP 01 11 3019

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
E P,Y P,A	EP 1 037 258 A (MATSUSHITA ELECTRIC IND CO LTD) 20 September 2000 (2000-09-20) * abstract; claims 1,3,11,20-22 * * page 2, line 5 - line 6 * * page 3, line 26 - line 40 * * page 5, line 42 - line 46 * * page 10, line 35 - line 40 * * page 11, line 32 - line 43 *	11-13, 19,20 15,16 1-5, 8-10,18	
A	-& PATENT ABSTRACTS OF JAPAN vol. 2000, no. 2, 29 February 2000 (2000-02-29) -& JP 11 307048 A (MATSUSHITA ELECTRIC IND CO LTD) * abstract * * page 2 * * paragraphs [0007], [0008], [0010], [0012], [0013], [0015], [0017], [0024], [0025], [0036], [0040] *	11,17-19	
A	-& PATENT ABSTRACTS OF JAPAN vol. 2000, no. 6, 22 September 2000 (2000-09-22) -& JP 2000 090880 A (MATSUSHITA ELECTRIC IND CO LTD), 31 March 2000 (2000-03-31) * abstract *	1,2,9, 11,17-19	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	-& DATABASE WPI Section Ch, Week 200027 Derwent Publications Ltd., London, GB; Class L03, AN 1999-508953 XP002180219 * abstract *	1-3,11, 17-19	
A	-& WO 99 43020 A (TAKAHASHI KIYOSHI ;KIRYU HIDEAKI (JP); SAITO TAKESHI (JP); TAKEDA) 26 August 1999 (1999-08-26) * abstract *	1,2,9	
<p style="text-align: center;">---</p> <p style="text-align: center;">-/--</p>			
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 October 2001	Examiner Martín Vicente, M
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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 3019

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
E P,Y P,A	<p>EP 1 063 681 A (STANLEY ELECTRIC CO LTD) 27 December 2000 (2000-12-27) * claims 8-20 *</p> <p>* abstract; claims 8-20 *</p> <p>* page 2, line 5 - line 10 *</p> <p>* page 3, line 4 - line 5 *</p> <p>* page 3, line 17 - line 18 *</p> <p>* page 3, line 32 - line 38 *</p> <p>* page 4, line 27 - line 34 *</p> <p>* page 8, line 22 - line 24 *</p> <p>* page 8, line 53 - line 57 *</p> <p>* page 9, line 50 - line 56 *</p> <p>* page 10, line 34 - line 36 *</p> <p>---</p>	<p>11-13, 19,20 15 18</p>	
E P,Y	<p>EP 1 011 126 A (PATRA PATENT TREUHAND) 21 June 2000 (2000-06-21)</p> <p>* abstract; claims 9,10 *</p> <p>* page 2, line 14 *</p> <p>* page 2, line 43 *</p> <p>* page 2, line 52 - page 3, line 2 *</p> <p>* page 3, line 44 - line 54 *</p> <p>* page 5, line 45 - line 48 *</p> <p>* page 6, last line *</p> <p>---</p> <p style="text-align: center;">-/--</p>	<p>11,13, 17-19 15,16,20</p>	
<p>TECHNICAL FIELDS SEARCHED (Int.Cl.7)</p>			
<p>The present search report has been drawn up for all claims</p>			
Place of search		Date of completion of the search	Examiner
THE HAGUE		16 October 2001	Martín Vicente, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons</p> <p>& : member of the same patent family, corresponding document</p>			

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Application Number
EP 01 11 3019

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,Y A	EP 0 940 841 A (OSRAM SYLVANIA INC) 8 September 1999 (1999-09-08) * abstract * * column 1, line 30 - line 33 * * column 3, line 10 - line 54 * * column 4, line 48 - line 51 * * column 7, line 39 - line 41 * * column 8, line 13 - line 15 * * column 9, line 54 - line 55 * * column 11, line 32 - line 35 * * column 12, line 9 - line 11 * ---	15,16,26 1-3,6,8, 10	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
D,Y A	EP 0 942 454 A (OSRAM SYLVANIA INC) 15 September 1999 (1999-09-15) * abstract * * column 3, line 20 - line 31 * * column 5, line 47 - line 49 * * column 10, line 2 * * column 11, line 7 - line 16 * * column 11, line 22 - line 28 * ---	15,16,26 1,2,7,9, 10,17	
D,Y A	PATENT ABSTRACTS OF JAPAN vol. 004, no. 133 (E-026), 18 September 1980 (1980-09-18) & JP 55 086062 A (TOSHIBA CORP), 28 June 1980 (1980-06-28) * abstract * --- -/--	15,16 1,2	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 October 2001	Examiner Martin Vicente, M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 3019

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 10, 31 October 1997 (1997-10-31) & JP 09 161725 A (SONY CORP), 20 June 1997 (1997-06-20) * abstract *	1,2,9,10	
A	EP 1 003 204 A (FUSION LIGHTING INC) 24 May 2000 (2000-05-24) * abstract * * column 4, line 40 - line 42 * * column 6, line 9 - line 10 * * column 11, line 28 - line 56 *	11	
A	WO 92 08240 A (FUSION SYSTEMS CORP) 14 May 1992 (1992-05-14) * abstract * * page 4, line 12 - line 17 * * page 5, line 18 - line 27 * * page 6, line 17 - line 19 *	11	
P,A	US 6 222 320 B1 (STOCKWALD KLAUS) 24 April 2001 (2001-04-24) * column 2, line 10 - line 19 * * column 3, line 33 - line 35 * * column 5, line 1 - line 6 *	11	TECHNICAL FIELDS SEARCHED (Int.Cl.7)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 October 2001	Examiner Martín Vicente, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-10-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0016360	A	23-03-2000	CN 1277732 T	20-12-2000
			EP 1032010 A1	30-08-2000
			WO 0016360 A1	23-03-2000
			CN 1284736 A	21-02-2001
			EP 1037257 A2	20-09-2000
			JP 2001110356 A	20-04-2001
WO 9905699	A	04-02-1999	CN 1234907 T	10-11-1999
			EP 0931330 A1	28-07-1999
			WO 9905699 A1	04-02-1999
			JP 2001501026 T	23-01-2001
			US 6137230 A	24-10-2000
EP 1111653	A	27-06-2001	EP 1111653 A1	27-06-2001
			US 2001005116 A1	28-06-2001
EP 1076353	A	14-02-2001	DE 19937312 A1	15-02-2001
			CN 1283867 A	14-02-2001
			EP 1076353 A1	14-02-2001
			HU 0003245 A2	28-03-2001
			JP 2001076670 A	23-03-2001
EP 1037258	A	20-09-2000	JP 2000090880 A	31-03-2000
			JP 11307048 A	05-11-1999
			EP 1037258 A1	20-09-2000
			US 6265827 B1	24-07-2001
			CN 1256790 T	14-06-2000
			WO 9943820 A1	26-08-1999
EP 1063681	A	27-12-2000	JP 2001006610 A	12-01-2001
			EP 1063681 A2	27-12-2000
EP 1011126	A	21-06-2000	DE 19857585 A1	15-06-2000
			EP 1011126 A2	21-06-2000
			HU 9904194 A2	28-06-2000
			JP 2000182564 A	30-06-2000
EP 0940841	A	08-09-1999	US 6043614 A	28-03-2000
			EP 0940841 A2	08-09-1999
			JP 11317103 A	16-11-1999
EP 0942454	A	15-09-1999	US 5997162 A	07-12-1999
			EP 0942454 A2	15-09-1999
			HU 9900595 A2	28-10-1999
			JP 11312495 A	09-11-1999

EPO FORM P0459

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 11 3819

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16-10-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 55086062	A	28-06-1980	NONE	
JP 09161725	A	20-06-1997	NONE	
EP 1003204	A	24-05-2000	EP 1003204 A2	24-05-2000
			AU 3977193 A	18-11-1993
			CA 2133344 A1	28-10-1993
			EP 0636275 A1	01-02-1995
			HU 68508 A2	28-06-1995
			JP 7509336 T	12-10-1995
			RU 2125322 C1	20-01-1999
			WO 9321655 A1	28-10-1993
			US 6020676 A	01-02-2000
			US 5798611 A	25-08-1998
			US 6072268 A	06-06-2000
			US 5834895 A	10-11-1998
			US 5670842 A	23-09-1997
			US 5757130 A	26-05-1998
			US 5804922 A	08-09-1998
			US 5773918 A	30-06-1998
			US 5866980 A	02-02-1999
			US 5682080 A	28-10-1997
WO 9208240	A	14-05-1992	AT 151201 T	15-04-1997
			AU 662889 B2	21-09-1995
			AU 8925191 A	26-05-1992
			BR 9107033 A	22-03-1994
			CA 2093921 A1	26-04-1992
			DE 69125499 D1	07-05-1997
			DE 69125499 T2	17-07-1997
			DK 554350 T3	22-09-1997
			EP 0554350 A1	11-08-1993
			ES 2101759 T3	16-07-1997
			GR 3023695 T3	30-09-1997
			HU 214794 B	28-05-1998
			HU 65057 A2	28-03-1994
			JP 3078523 B2	21-08-2000
			JP 10228886 A	25-08-1998
			JP 2931819 B2	09-08-1999
			JP 6132018 A	13-05-1994
			KR 237859 B1	15-01-2000
			RU 2130214 C1	10-05-1999
			US 5493184 A	20-02-1996
			US 5404076 A	04-04-1995
			WO 9208240 A1	14-05-1992
			WO 9321655 A1	28-10-1993

EPO FORM P4439

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 11 3019

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-10-2001

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9208240	A	US	6020676 A	01-02-2000
		US	5798611 A	25-08-1998
		US	5661365 A	26-08-1997
		US	5834895 A	10-11-1998
		US	5606220 A	25-02-1997
		US	5670842 A	23-09-1997
		US	5757130 A	26-05-1998
		US	5804922 A	08-09-1998
		US	5773918 A	30-06-1998
		US	5866980 A	02-02-1999
		US	5682080 A	28-10-1997
		US	5977724 A	02-11-1999
		US	5841242 A	24-11-1998
		US	5925981 A	20-07-1999

US 6222320	B1	24-04-2001	DE 19901987 A1	27-07-2000
